Agent	Weed targeted	Sites/ Recommendations	Type	Collection Notes	Effectiveness
Aceria malherbae	Field bindweed (may attack Calystegia spp.)	Spotty,isolated sites, Unlikely on USFS,doesn't do well in R6 climate,poss on Admin or Grasslands; warm sites	MITE	Transfer infested leaves/galls during growing season, early season allows mite populations more time to expand.	Stunts plants, reduces flowering, reduces plant density in Texas.
Agapeta zoegana	knapweeds (prefers spotted, also diffuse)	Widespread in OR, possible gaps; prefers large plants, scattered density, cooler knapweed sites	INSECT	Adults with blacklights, early July-September, short adult lifespan; or dig roots.	Reduces biomass and density.
Agrilus hyperici	St. Johnswort	Spotty in E OR & WA, disperses well; would use on west side if could establish, prefers warm dry with large stems; prone to fungus on wet sites; may want to redistribute	INSECT	Sweep adults, June-July; release 100 on well-established plants.	Most infested plants die; will attack plants in shade undamaged by Chrysolina hyperici.
Aphthona abdominalis	leafy spurge	Failed, never recovered in US	INSECT	Not needed	
Aphthona cyparissiae	leafy spurge	Widespread;moist, high humidity and Mediterranean, dry summers with sun, sand, rock; Avoid sites with depressions, N aspects, bare ground; larvae need 4 months cold. Canadian research sug. prefers: flowering plants >51 cm, 50-125 stems/sq m., 40-60% sand.	INSECT	Sweep adults June-July.	Less effective than A.lacertosa; when *Aphthona* spp. establish reductions in cover, density, aboveground and root biomass occur in 3-5 yrs.
Aphthona czwalinae	leafy spurge	Widespread; moist, high humidity and Mediterranean, dry summers with sun, sand, rock; larvae need 4 month cold <4 C.	INSECT	Sweep adults June-July.	Less effective than A.lacertosa; when *Aphthona* spp. establish reductions in cover, density, aboveground and root biomass occur in 3-5 yrs.
Aphthona flava	leafy spurge	Well distributed, spotty establishment; more mesic than A. cyparissiae or A nigriscutis; larvae need 4 month cold period; sunny locations.	INSECT	Sweep adults July.	Very effective near Bozeman, little impact in many other sites.

Aphthona lacertosa	leafy spurge	Widespread; more mesic than other Aphthona spp.;do not redistribute from area where parasitic protozoan Nosema is present	INSECT	Sweep adults June-July.	Most effective agent on leafy spurge. When it establishes, reductions in cover, density, aboveground and root biomass in 3-5 years. Expected to do well in northern US but not southern.
Aphthona nigriscutis	leafy spurge	Widespread,may want to move within few miles; larvae need 4 month cold period; maximum sun exposure, well-drained, smaller and more scattered spurge, *Stipa* spp. sites.	INSECT	Sweep adults June-July.	Particularly effective in Canada.
Aplocera plagiata	St. Johnswort	Warm and dry with long summers; common in E OR & WA,disperses 50 miles.	INSECT	Sweep larvae in summer, 500 indiv. adequate for release.	Variable; appears to need warm, dry areas with summer long enough to allow two full generations. Effective in BC.
Aulacidea acroptilonica	Acroptilon repens	Not yet released in OR/WA, ODA will apply for permit 2010, releases planned for summer 2010.	INSECT		
Bangasternus fausti	knapweeds (Diffuse, spotted, and squarrose)	Widespread, hot & dry, low elev.	INSECT	Transfer adults in the summer.	Can consume up to 100% of seeds in a flower head; attacks other insects in the flower head.
Bangasternus orientalis	yellow starthistle	Widespread; cool climates unfavorable.	INSECT	Sweep or hand pick in summer.	Single larva destroys 50-60% of seeds in a head.
Botanophila seneciella	tansy ragwort	Prefers meadows and openings	INSECT	Sweep adults in early summer, release 50. Transplant infested plants.	Widespread, along with T. jacobaeae and L. jacobaeae tansy ragwort control attributed to these three agents.

Brachypterolus pulicarius	toadflax	Accidental, widespread on yellow	INSECT	Collect adult with sweep net or aspirator	effective in reducing seed production of yellow toadflax
Bradyrrhoa gilveolella	Rush skeletonweed	Recent release, not established; permit issued 5/02.	INSECT	Unknown	Can kill aboveground parts, general effectiveness unknown.
Bruchidius villosus	Scotch broom, French, Spanish, and Portugese	recent intro, very limited avail in W OR & WA,accid in Carolinas, OR wrote petition & tested in OR & WA	INSECT	Collect and redistribute adults after mating, heavy duty sweep nets or beating sheets. Collectible in OR in 2003.	Reduces seed production and may reduce spread.
Calophasia lunula	toadflax	Not est at high elevations, poss due to cold; warmer sites poss better; does not do well where ant pops high.	INSECT	One to three generations/yr; transfer larvae.	Widespread near Spokane, ineffective,not recovered in OR; strong flier; most common on roadside stands, low density in large stands.
Ceutorhynchus litura	Canada thistle	Spotty distribution, not demonst effective; may be effective at very high densities where thistle populations are stressed.	INSECT	Collect adults from early spring shoots; release in groups of 30-50.	While it reduces overwintering survival of C. thistle, surviving plants provide source for reinfestation. Needs augmentation with another agent.
Chaetorellia acrolophi	knapweeds (spotted preferred, also diffuse, squarrose, purple starthistle, C. leucophaea, and C. vallesiaca)	Spotty distribution,Lane Co, Hood R.; moist habitats in OR; dry, south-facing slopes, scattered plants in Brit.Col.	INSECT	Clip larvae-infested seed heads in fall or early spring; best to rear adults and separate from other emerging insects, esp predators.	Establishment in some areas difficult due to competition with seed head weevils and moths.

Chaetorellia australis	yellow starthistle	Widespread,spread 50mi/yr; apparently requires C. cyanus in same area for first generation that emerges prior to C. solstitialis availability.	INSECT	Sweep adults or collect infested seed heads in late winter and place in new area in spring.	Larval feeding reduces seed production 80-90%.
Chamaesphecia hungarica	leafy spurge	not yet established, possible future introductions.	INSECT	Unknown	May be effective in moist sites.
Cheilosia corydon	Italian thistle, slenderflower thistle, musk, plumeless	Prefers larger slenderflower thistle,Widespread in Douglas Co OR	INSECT	Sweep adults in early spring (March-April) or dig roots in fall. Early emergence may limit range due to absence of flowers.	Available for collection in 2003. Effectiveness unk. May impact nontargets.
Chrysolina hyperici	St. Johnswort	Widespread in mesic; cool moist summers, cold winter w/o snow; does not do well in shade.	INSECT	Sweep adults early to mid June, release 250+.	Variable; more effective in CA and w OR than ID and WA.
Chrysolina quadrigemina	St. Johnswort	Widespread in dry; dry summers, mild, moist winters	INSECT	Sweep adults from early flowers, early to mid June, release 250+. Late summer pops female and will not breed w/o males.	Variable, most effective in CA where it was responsible for the weed's removal from the noxious weed list.
Coleophora klimeschiella	Russian thistle	Widespread,moves on own	INSECT	Not needed	High parasitism and predation by natives make this ineffective.
Coleophora parthenica	Russian thistle	Widespread,moves on own	INSECT	Not needed	Feeding damage has little effect, also heavily attacked by predators and parasitoids.
Cyphocleonus achates	knapweeds (spotted preferred, also diffuse)	Prefers lg stems & monoculture stands,well-drained, low, hot, dry, gravel pits	INSECT	Collect adults Aug-Sept or rear from roots.	Reduces biomass and density.
Cystiphora schmidti	Rush skeletonweed	Widespread, most attack in open locations, well-drained soil, <16" annual precip, yrly ave temp >63F.	INSECT	Collect galled stems early July to late September; remove seedheads/flowers, tie stems into teepees, set among uninfested plants.	Native parasitoids greatly diminish effectiveness.

Dasineura capsulae	leafy spurge	Permitted for release in 1991; not yet established due to very high parasitism.	INSECT	Collect galls with both mature larvae and pupae; fragile flies.	Unknown.
Diorhabda elongata	tamarix	lots of use in E OR when available: Snake and Owyhee R	INSECT	All stages, nylon mesh sleeves tied on branches may deter predators and dispersal.	Defoliated plants dieback, severe defoliation for 2 years killed some large plants.
Eriophyes chondrillae	Rush skeletonweed	Widespread, disperses well, found on isolated plants; undisturbed, well-drained, south- and west-facing slopes.	MITE	Transfer galled stems July-mid October, success depends on ambient RH, transfer in evening or damp days.	Most effective agent on this weed so far, impact reduced in CA due to predaceous mites.
Eteobalea intermediella	toadflax	released and recovered in MT, unavail yet for redistribution	INSECT	Sweep in late summer.	Unknown.
Eteobalea serratella	toadflax, yellow	released and recovered in MT, unavail yet for redistribution	INSECT	Sweep in late summer.	Unknown.
Eustenopus villosus	yellow starthistle	Widespread,spreads well,if site w/o, FS should put; cool climates unfavorable.	INSECT	Sweep or hand pick adults in June or July.	Feeding on flower heads and buds can cause 90-100% seed reduction in a head.
Exapion ulicis	gorse	Widespread W OR & WA, all gorse except where gorse and weevil destroyed by fire.	INSECT	Not needed	May retard the spread of the plant but does not reduce established density; 30-95% of seedpods attacked.
Exapion fuscirostre	Scotch broom	Widespread W OR & WA,mod effect,affect 50% seeds; prefers meadows and hills w/S exposure; damp and cold, N face undesirable.	INSECT	Adults, April and May; release 100-250 adults.	Reduces seed production up to 60%; stand density reduction is questionable.
Galerucella calmariensis	purple loosestrife	Apparent synergism between two Galerucella spp.: alone G. pusilla density too low for control, G. calmariensis poss limited by dispersal; G. calmariensis attack transfers nutrients to regrowth, which allows G. pusilla to attain high densities. No direct toxic effect of triclopyr amine.	INSECT	Small releases tend to remain small, releases of 2000 larvae or adults produce outbreaks. Place larval-infested foliage on plants in the new stand.	Widespread, effective, FS may want; biomass at several sites in Oregon and Washington has been reduced by 90%.

Galerucella pusilla	purple loosestrife	As above.	INSECT	Releases of 2000 produce outbreaks. Place larval-infested foliage on plants in the new stand.	Widespread, effective, FS may want; biomass at several sites in Oregon and Washington has been reduced by 90%.
Gymnetron antirrhini	toadflax	Biotype approved intro in WA & MT,may want to spread but generally common; does not withstand extreme winter cold; avoid releasing where flower feeding beetle (B. pulicarius) is abundant.	INSECT	Sweep adults in July and August.	40-60% infested seed heads, limited effect on stand density
Gymnetron linariae	toadflax, Dalmatian	Recent release, not established	INSECT	Sweep or hand pick in summer.	Unknown.
Hyles euphorbiae	leafy spurge	Numerous intros Failed, unlikely to be introduced;warm summers, mild winters.	INSECT	Hand pick larvae summer to fall, release 500+ on warm, rocky, sandy sites.	Defoliates in midsummer and spurge later refoliates; limited by virus in U.S.
Hylobius transversovittatus	purple loosestrife, *L. alatum* also used during testing but use in field unknown.	Spotty,expensive to rear and collect; stands with Galerucella may be unsuitable.	INSECT	Cut path through infested stand, collect adults with flashlight for 2 hours after sunset along path. Weevils drop when disturbed. Release 25 at sites with large plants.	Feeds on root storage reserves, believed to complement leaf beetle damage.
Jaapiella ivannikova	Acroptilon repens	have EA 2009	not recovered from WY yet in 2008		
Larinus minutus	knapweeds (diffuse, meadow, spotted, squarrose, C. arenaria, and Calcitrapa spp.)	Widespread,may want to move within few miles;hot, dry areas.	INSECT	Adult sweep net, hand pick, aspirate in early summer	Heavy defoliation can result in stunting and death; larvae consume entire flower head contents. Dramatic reductions in MT,OR & WA.

Larinus obtusus	knapweeds (spotted and meadow, occ diffuse)	Limited distribution,priority on meadow in E OR; prefers spotted knap.; prefers slightly moist sites.	INSECT	Move larvae and pupae in seed heads in late July-early August, or sweep adults during flowering.	Defoliation and seed feeding; populations increase slowly.
Larinus curtus	yellow starthistle	Widespread in E OR & WA, does poorly on westside, may need redistribution in spots in E; cool climates unfavorable.	INSECT	Sweep or hand pick adults at 10% bloom, late June to early August.	Larval feeding can reduce seed production by 100%.
Leucoptera spartifoliella	Scotch broom	Widespread	INSECT	Not recommended	Host density changes not documented; heavily parasitized in OR & WA, may increase susceptibility to pathogens.
Longitarsus jacobaeae	tansy ragwort	Sunny pastures below 800 meters, survives cold where snow keeps ground from freezing deeply.	INSECT	Collect adults with vacuum from infested rosettes after first fall rains; sweep net bolted plants; transfer 100-500.	Widespread; one of three agents attributed with ragwort control in OR.
Mecinus janthinus	toadflax	Limited distribution,priority E OR; hot, dry forest and grassland, large stemmed plants; overwinter survival best in s BC or snow-cover.	INSECT	Light sweep net in May to July, earlier better; release 200.	Sig plant density reduction in BC and WA.
Metzneria paucipunctella	knapweeds (spotted preferred, also diffuse and meadow)	Widespread; does not tolerate severe winters; bulk storage attracts predatory mites.	INSECT	Clip larvae-infested seed heads late summer, early fall, early spring. Seed heads often infested with straw itch mites which attack biocontrols and cause severe human itching.	Although larvae destroy other agents in seed heads, greatest reduction in seed production occurs when moth and gall flies are all present. Deer mice cause heavy overwinter mortality.
Microlarinus lareynii	Punctureveine, also attacks Tribulus cistoides and some Kallstroemia spp.	Isolated sites, limited by cold winter temps., can use inundative in other areas.	INSECT	Collect adults from soil litter with vacuum or aspirator or put plants and litter in bag in sun and collect crawling adults.	Very effective in warm climates.

Microlarinus lypriformis	Puncturevine, also T. cistoides and some Kallstroemia spp.	Same as above.	INSECT	Collect adults from soil litter, same as above.	Very effective in warm climates.
Nanophyes marmoratus	purple loosestrife	Sites without prolonged flooding; tolerates wide range of conditions incl. high tidal exchange, low host density; excellent host-finding ability.	INSECT	Adults with beating tray and beat stick; release 100-200 adults per site.	Widespread, effective, 1000's per plant;
Oberea erythrocephala	leafy spurge	Limited distribution; larvae bore down stem with large pith ≥3mm; warm, well-drained sites.	INSECT	Sweep and hand pick adults at peak flowering, release 100+, may need to cage to establish.	Ineffective in western Canada prob due to small pith; attacks only specific biotypes of spurge
Pelochrista medullana	knapweeds (spotted and diffuse)	Just released, difficult to establish,not yet available; prefers dry; damage identical to Agapeta.	INSECT	Collect infested roots in fall, winter or early spring.	Reduces plant biomass.
Phrydiuchis tau	Mediterranean sage, also clary	Widespread,may want to move within few miles if Med sage becomes est around John Day; best on warm, dry sites. Attacks clary sage as well but prefers Med sage.	INSECT	Sweep adults in late spring and early summer when flowers in 25% bloom.	Effective on sites with strong perennial component and little grazing, little effect on salt-desert scrub or annual dominated.
Prokelisia marginata	Spartina anglica, S. alterniflora, S. foliosa	approved, not nec on FS lands yet; intertidal areas	INSECT	Vacuum or sweep adults and nymphs June-Oct	early results promising for S. alterniflora in Willapa Bay
Psylliodes chalcomera	Musk thistle, also Italian, plumeless, and Illyrian.	Approved, but still unavailable, establishment unknown; found in cold and hot areas of Italy.	INSECT	Sweep adults.	Unknown.

Pterolonche inspersa	knapweeds (Diffuse, spotted, and squarrose)	Once established in OR but not recovered since 2000; Mediterranean climate best.	INSECT	Transfer adults, eggs, larvae, or pupae.	Once infested 20% of plants but now undetectable due to knapweed reduction from seed head weevils (Larinus spp.).
Puccinia chondrillina	Rush skeletonweed	Widespread; most effective in mesic sites, less damaging in hot and dry sites.	FUNGUS	During summer move infected stems and place in cool evening and when dew period anticipated; misting uninfected plants aids infection rate.	Pathotype available has little effect on SW OR late-flwr or NE WA, N ID early-flwr biotypes. In some CA areas considered more effective than mite or midge.
Puccinia jacea var. solstitialis	yellow starthistle	Established in OR, not yet in WA	FUNGUS	Possibly avail for redistrib 2010.	Recom for sites with seasonal fog.
Sphenoptera jugoslavica	knapweeds (diffuse preferred, also spotted and squarrose)	Very widespread; warm, dry areas; females need 5 days > 86F to lay eggs.	INSECT	Collect adults with sweep net in mid-July early evening.	Reduces biomass, seed production, and density.
Spurgia esula	leafy spurge	Dense spurge, south-facing slopes in cool climates, some shade okay.	INSECT	Clip galls late May to October, release 100+ in dense, well-watered, sheltered spurge sites.	Ineffective, attacked by native species, not likely for USFS; galls on leafy spurge too sparse for much impact.
Subangiuna picridis	Russian knapweed, diffuse knapweed	nematode,Isolated sites, need better dissemination;difficult to establish; does not do well in dry areas, best in misty areas.	NEMATODE	Collect galls in fall and place on soil. Nematodes will emerge from disintegrating galls and move to shoots in wet spring.	Disperses very slowly; some sites now have native grasses but if area too small, weed will reinvade from edges.
Terellia virens	knapweeds (spotted preferred, also diffuse)	Prefers spotted knap.; isolated sites,higher elev. than weevils; does not survive well in seedheads with L. minutus, prefers cooler and wetter than weevils.	INSECT	Collect infested seedheads in fall or early spring; must be kept moist; best to separate out parasitoids.	Reduces seed production; limited availability so effect still not determined.

Tetranychus lintearius	gorse	Widespread W OR & WA, favors unshaded gorse patches away from the ocean.	MITE	Not needed	Now attacked near Bandon, OR by accid pred mite from greenhouse industry; at many other sites attacked by ladybird beetle and rendered ineffective.
Trichosirocalus horridus	Subtribe Carduinae: musk, plumeless, Italian, Canada, and bull thistles are accepted.	Intro everywhere, recovered Klamath R only, not likely for USFS,poss on natives	INSECT	Sweep in July or pick in spring prior to bolt.	Seldom effective by itself. Prohib in CA due to concern for artichokes. Requires 3-5 years to build population. Disperses well.
Tyta luctuosa	Field bindweed (also may attack Calystegia spp.)	Recent releases, moths recovered; unlikely on FS; difficult to establish; recorded to feed on native *Calystegia* spp.	INSECT	Transfer larvae and adults, can black light;not approved in CA	Does not significantly damage hedge bindweed (*Calystegia sepium*), effect on field bindweed unk.
Urophora stylata	bull thistle	Widespread in W OR with gaps,not survive E OR, limited distrib in WA; while most seeds in an area can be killed, not effective due to recolonization by far-flying seeds; similar initial seed reduction as mowing but mowing allows later flowering when flies not available for seed predation.	INSECT	Collect 20-50 galled seed heads in late fall, keep cool and dry through winter and release newly emerged adults in spring to avoid transferring associated parasites; sweep adults between May and July, transfer 130+ (half female) per release.	Because Bull thistle is transient, it is difficult to maintain fly populations for more than a few years in any location. Flies disperse rapidly.
Urophora cardui	Canada thistle	Widespread,may want to move within few miles;does best in scattered, semi-shaded, moist C. thistle stands.	INSECT	Locally may transfer 50-100 galls in spring; otherwise collect galls in fall, winter, early spring, rear adults, separate other insects and release onto misted plants. Collect galls from similar habitats as cold-adapted strains have been developed.	Limited effectiveness; provides metabolic sink that reduces vigor.
Urophora xanthippe	Russian knapweed	ODA experimental releases 2010	INSECT		

Urophora kasachstanica	Russian knapweed	ODA experimental releases 2010	INSECT		
Urophora quadrifasciata	knapweeds (black, brown, diffuse, measow, short-fringed, spotted, squarrose, and cornflower)	Widespread; Larvae do not tolerate severe winters	INSECT	Clip larvae-infested seed heads early spring and fall, sweep adults June to July.	Where both *Urophora* species are present, seed production is reduced at least 50%. *Urophora* species freq destroyed by seed head moth and weevils.
Urophora affinis	knapweeds (spotted, diffuse, squarrose)	Widespread; Does best in mesic or wetter years; check for presence prior to redistribution.	INSECT	Clip larvae-infested seed heads early spring and fall, sweep adults in June.	Where both *Urophora* species are present, seed production is reduced at least 50%. *Urophora* species freq destroyed by seed head moth and weevils.
Urophora solstitialis	Musk thistle and plumeless thistle; In Europe assoc with Carduus spp.	Recent release in MD,MT, and OR, not established yet in US, difficult to establish.	INSECT	Collect thistle heads after galls harden in August-September.	Unknown.
Urophora sirunaseva	yellow starthistle	Widespread in western US, SW OR;does not do well in windy areas, not in NE OR; excellent disperser.	INSECT	Sweep adults late May and July.	Rarely exceeds 25% attack rate, effectiveness limited.
Zeuxidiplosis giardi	St. Johnswort	Damp, mod to high humidity, high elevations; not suitable for dry summers or continuous wind.	INSECT	Best to establish plants from new population in pots, infest with midges, then transplant.	many intro in OR failed,est in So CA but para; high RH, does poorly in dry, windy; best in HI.